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AGROTECHNOLOGY AND FOOD RESOURCES

No. 8

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CONTENTS

FIRST STEPS OF A UNIFIED AGROCHEMICAL SERVICE

Moscow PRAVDA in Russian 18 Jul 80 p 2

[Article entitled "Increase of Fertility," by V. Nikonov, chairman of the "Soyuzsel'khozkhimiya" Association, USSR deputy minister of agriculture]

/Text/ The fields of "Dnepr" kolkhoz in Cherkasskaya Oblast suffered much bad weather in the past year. There were dry periods accompanied by intense summer heat. However, the dry wind could not cause great damage. The kolkhoz bookkeeping shows figures which would even please the farmers in a good year. The farm collective harvested, from all sowings, an average of 40.5 quintals of grain per hectare and 44.3 quintals of millet. The average yield for the rayon was exceeded by one-third.

The question arises: what helped the corn growers of "Dnepr" kolkhoz overcome the caprices of nature? A broad complex of operations directed to the increase of the farm crop lays at the base of their success. An important role in it belongs to the fertility service. The agrochemical point created here has grown into a specialized well-equipped cost accounting subdivision. Its collective gathers and prepares organic fertilizers, skillfully organizes the storage of mineral fertilizers and means of plant protection and uses them strictly according to the cartogram. In the past year, each hectare of arable land on the farm received 16 tons of organic fertilizers and 7.5 quintals of mineral fertilizer.

More than 3000 agrochemical points similar to that established at the "Dnepr" kolkhoz are being organized in the country. In addition to this, 27,000 mechanized fertilization detachments are operating. The scale of their operation is considerable. In the past year, they have applied 76 million tons of mineral fertilizer and 822 million tons of organic fertilizer; they have limed 6.6 million hectares of acid soils and have protected 70 million hectares of plantings from pests, diseases and weeds.

Appearing at the July 1978 Plenary Session of the CPSU Central Committee, comrade L.I. Brezhnev noted that, among the measures for intensification of agricultural production, serious attention must be given to the further development of production of mineral fertilizers and means of plant protection and concentration of the agrochemical service in the system of agricultural agencies.

A unified specialized agrochemical service is now being established in the country. Qualified personnel are being selected for it and the necessary material and technical resources are being allocated. The period, which may be called the organizational period, is now over. There are 3000 "Sel'khozkhimiya" associations in oblasts and 152 in rayons and there is a scientific-production association in each union republic.

The center of this entire service became the All-Union Association "Soyuzsel'khozkhimiya." Its production and scientific activity in the immediate future should greatly promote the increase of crop yield, the increase of gross harvests and the improvement of quality of the products. The volume of agrochemical operations already exceeds 5 billion rubles. Its timely and efficient fulfillment and the complex solution of problems of increasing soil fertility and improving plant protection being achieved mean an increase of additional millions of tons of grain, fodders and other production.

It is well understood that the period of establishment of new subdivisions involved difficulties. Many problems of an organizational, economic or technological nature require a change in the previous approach, a serious search and profoundly thought out solutions. Thus, the "Sel'khozkhimiya" association includes 206 regional and zonal agrochemical laboratories, 152 plant protection stations. What were their duties previously? They studied soils, developed cartograms and made recommendations to kolkhozes and sovkhozes. Now their activity is quite different. They must furnish each farm with planning estimates for conducting agrochemical operations on all fields and for all crops.

There is also great concern for the organization of agrochemical stations. Their physical foundation is the mechanized fertilizing detachment. Now it is important, in each rayon, to think out carefully the plan of distribution of stations and to determine upon what basis (farm or inter-farm), they will be created and to select, from typical designs, the most applicable for a given zone, storage facilities, bases for storing and servicing equipment, and the rational disposition of runways.

A state-cooperative form of agrochemical servicing is being tested in practice in the Moldavian SSR, Belgorodskaya and L'vovskaya oblasts. In our opinion, it has a great future. Precisely, here is being opened a broad pathway for operational cooperation and unification of efforts of the state and the farms for creation of a material and technical base of

chemization, the transformation of it from a service into a technological link of kolkhoz-sovkhoz production.

Of course the agrochemistry service cannot manage without the help of scientists. We must have clear cut, minutely worked out principles of economic inter-relationships between agricultural enterprises and production associations of "Sel'khozkhimiya." We must find and test in practice the wage for tractor operators and specialists which would fit in completely with the end results — with the crop yield and output from each kilogram of nutrients.

The attention of specialists of the agrochemical service is focused, today, on the problem of complete keeping capacity of mineral fertilizers throughout their path from plant to field. Special automatic unloading freight cars for transporting mineral fertilizers are already being produced. But, how can they be used if most rayon associations and oblast bases do not have suitable storehouses and cannot accomodate such freight cars? Besides, this is not the only obstacle. The development of the material and technical base of chemization still lags, on the whole, behind the rates of output of chemical production. Let us return to the railroad side storehouses. Only 37 percent of the need for them is being satisfied and also, there are deficiencies in the storehouses in kolkhozes and sovkhozes. Is it not amazing that the storage of mineral fertilizer is extremely unsatisfactory and that great losses of nutrients are permitted? The elimination of these shortcomings is one of the main problems of the new service.

Voluminous data which science and practice make available indicate that the most effective method of applying mineral fertilizers is the local method. This method doubles the yield. However, no special technique is available and only 2 percent of the mineral fertilizer is applied to the soil locally. At the same time, more than one-half of the fertilizers is "scattered" by an uneconomical method of scattering which does not provide the required yield. It seems that it is time for scientific research and experimental design organizations to work seriously for the improvement of the system of machines and the Ministry of Farm Machinery to begin output of new, more productive means of mechanization.

Every year, farms are increasing the use of fertilizers, especially composts prepared from peat, manure and mineral fertilizers. However, the availability of machines for scattering them is inadequate, while those that exist are of low productivity. Their load-carrying capacity does not exceed 4-5 tons, and their operational reliability is low. We must increase the output of such machines as the PRT-10 and the PRT-16 [expansion unknown] which are highly productive loaders.

Among the many problems, associated with the increase of the agricultural crop, we must not forget the application of lime to acid soils, the improvement of solenetz soils and solonchak soils. There are more than 60 million hectares of acid soils and almost 80 million hectares of saline

soils in the country. Considerable work on the liming of soils has been performed in the last 7 years in the country. In Belorussia, for example, the area of acid soils was reduced by 23 percent, in Lithuania -- by 29 percent, in Estonia -- by 53 percent, in Moscow Oblast -- by 41 percent, in Pskovskaya Oblast -- by 28 percent. However, the rates of liming (6.6 million hectares per year) do not satisfy the needs of agriculture, especially in non-chernozem and Far Eastern zones of the RSFSR. Here tens of millions of hectares of acid soils never have been chemically improved and without this the effectiveness of use of fertilizers is very low.

Work on improvement of the agrobiological properties of solonetz soils is now underway but not on a large scale (200,000 - 300,000 hectares per year). One of the most important tasks of the agrochemical service is the expansion of the volume of chemical improvement of soils, the doubling of the fertile forces of such fields. This requires more serious scientific research and the practical redevelopment of a system of machines and a significant increase of production of gypsum-containing materials.

We must not fail to cite such a task of the agrochemical service as the mastery of new forms of mineral fertilizers such as anhydrous ammonia and liquid complex fertilizers. Production of liquid fertilizers is almost 40 percent cheaper than production of solid fertilizers and they can be scattered with 49 percent less expenditure. Regrettably, there are no special containers for the storage of liquid fertilizers. In the next 2 years, we must develop an effective scheme of distributing such storage tanks as well as a procedure for their construction.

The agrochemical service, in its unified complex, is making the first steps. The scope of its operations is intricate. However, it is of paramount importance in the solution of the production problem. Here much depends on personnel, who are now in or who will enter different subdivisions of the agrochemistry service. The "Soyuzsel'khozkhimiya" association has developed a program for training and advanced training of specialists. However, without middle and higher special schools, we cannot solve this problem.

Agriculture of the country presently uses more than 70 forms of fertilizers, chemical modifiers and more than 130 kinds of pesticides are recommended for use and methods of biological plant protection are being developed rapidly. All of this must be used properly and complexly not only for crop yield but also for environmental protection and only under the supervision of qualified specialists. Meanwhile, only 7 percent of the kolkhozes and sovkhozes have agrochemists and only 5 percent have entomologists. It appears that the colleges have illegally reduced the number of agrochemists graduates. The training of specialists in tekhnikums has practically ceased. In our opinion, the situation must be changed radically. Each republic should, in the next 5 years, provide its farms with agrochemists and entomologists trained at secondary or college level for this will decide the effectiveness of means of improving soil fertility and plant protection and, in the final analysis, increase crop yields.
[589-2791]

2791
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EXPERIENCE WITH SANITARY CONTROL FOR SOIL PRESERVATION IN CONNECTION WITH INCREASED USE OF CHEMICALS IN AGRICULTURE

Moscow GIGIYENA I SANITARIYA in Russian No 1, Jan 80 pp 64-65 manuscript received 6 Mar 79

KHIZHNYAK, N. I., BRUY, G. F., SYMENKO, M. A. and GOL'DENBERG, B. I., Kiev Oblast Sanitation Epidemiological Station

[Abstract] Since the use of pesticides in the Kiev Oblast is rapidly increasing, preventive sanitary soil inspection has been intensified at chemical centers and agrochemical complexes. Correct zoning of territory, its asphalting, mechanization of preparation of working solutions and of equipment servicing are the critical points to be considered. Centralization of seed presowing treatment is also important. Ongoing sanitary measures include regulation of pesticide use, stricter criteria for conducting chemical treatment, limited use of stable organochlorine compounds by replacing them with organophosphorus pesticides, a DDT ban (in effect since 1970) and increased use of biological methods. In addition, pesticide storage is being regulated, aerial application is limited, dry methods of seed treatment are banned, mechanization of loading and unloading is increasing and inspection and laboratory control has been strengthened. In the last ten years these measures have decreased pesticide contamination of water by a factor of 77, contamination of food, by a factor of 22.6, and of soil, 2.5. [413-12126]

BIOLOGICAL CONTROL OF INSECT PESTS

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 19 Aug 80 p 2

[Article by special correspondent Ye. Leont'yeva: "Useful Diseases"]

> [Text] Not everyone, of course, has seen a forest destroyed by harmful insects or a potato field that has been invaded by the Colorado potato beetle. But I have. One gets an uneasy feeling in an oak grove where there is to be heard a constant monotonous incomprehensible rustling sound--it is the feasting of the green oak roller moth in the branches; it gnaws at the leaves, rolls them into tubes, causing them to wilt and droop. And after the invasion of the Colorado potato beetle, the picture is even more pathetic: on a potato plantation only bare gray twigs are to be found sticking up. There exist about five thousand varieties of pests of forests, fields, orchards and vegetable gardens. They do tremendous damage. This is why the discovery made by the scientists of the Ukrainian Scientific-Research Institute of Plant Protection is so great.

Everyone knows that chemical preparations--insecticides--have long been used in the struggle against insects. Initially they raised one's hopes. But the problem is that the insects have gradually stopped reacting to a poison after it has been used for an extended period of time. Dosages have had to be increased, and this is dangerous since it leads to a gradual accumulation of the residues of chemical poisons in vegetables and fruits, in the soil and water, in the organisms of fish, animals and even man.

But a rather strange phenomenon was disclosed unexpectedly: in an extremely broad application of insecticides, when it would have been expected that the entire harmful community of insects would have died, they, quite the reverse began to intensively multiply. Habituation could in no way explain this. If not, then what?

An investigation of the "reverse reaction" produced the following results. The world of insects is many sided: it contains not only those which harm fields, forests, orchards and vegetable gardens but also parasites which destroy their own confreres. In other words--pests that inflict harm on pests. In the potato field, for example, the voracious Colorado potato beetle and the no less voracious carabide have fended well for themselves. Moreover, the beetle feeds on potato leaves and the carabide on the beetle's grubs. The former results in harm to people, the latter--benefit. And thus, a certain equilibrium is preserved in the fields, which does not permit the beetle to become "overbearing."

What is man able to do here? Conserve the carabide and help it fight the common enemy. But unfortunately, poison chemicals kill both the one and the other nonselectively. In addition, the carabides do worse than the beetles --they are destroyed both by the chemical poisons and by the fact that they eat the poisoned grubs of the beetles. The result is not difficult to figure out: useful insects are becoming scarcer, harmful ones are increasing.

Yes, a serious indictment has been made against chemical means of plant protection! With extended and not particular intelligent use, they not only develop immunity in harmful insects, they not only accumulate in products and in live organisms but at times they upset the biological balance that has existed for ages in nature. Then, perhaps, they should be rejected altogether? But then how shall we deal with the five thousand varieties of harmful insects?

When young microbiologist Nina Vladimirovna Lappa came to the Ukrainian Scientific-Research Institute of Plant Protection, she immediately made her choice. Her teacher became N. Telenga, doctor of biological sciences and one of the first in the country to use biological methods of dealing with plant pests. (If specialists from all the institutes working on this problem were to be gathered together, they would not number more than thirty). There was no need to speak of the state scope of the work--in the postwar years, insecticides became the chief shield of crops; biomethods were not even mentioned.

The scientists' attention was drawn to the following fact: the prolific Colorado beetle could lay up to 1,000 eggs, but its progeny did not increase by this number. Why did the grubs perish, where, at what stage, was the development of the progeny "cut off"? For one thing, there are extreme weather conditions, for example, sudden very cold weather. But insects are quite flexible in their adaptation to unexpected natural conditions...

Finally, microbiologists found out the chief cause--numerous diseases that afflict harmful insects.

This truth, of course, was not that new--entomologists have been actively engaged in the study of insect diseases. But it is the microbiologists

that "turned" them toward the protection of plants. Thus at the Kiev scientific-research institute, there was established a laboratory of microbiomethods that is now headed by N. Lappa. The laboratory's collective began the study of natural diseases of insects.

"We found under our 'loupe' the American white moth [amerikanskaya belaya babochka], a very harmful pest," Nina Vladimirovna relates. "It consumes many things; pears, apple trees, quince, the mulberry tree and a multitude of other trees. Private plots especially suffer, where it loves to settle. We became interested in the diseases of the apple worm. But we consider as before our principal objective to be the Colorado potato beetle."

According to some publications the beetle is no longer so dangerous in America. Could it be that there exist methods of rendering it harmless?

I have to admit that I proferred this question to Nina Vladimirovna with a certain amount of irony. The fact is that this is not the first decade in which scientists are fighting this Colorado bandit but they are still unable to counter it.

"I understand," my companion smiled sympathetically. "Actually, it is not difficult to become a skeptic when you do not see immediate benefits from what you are engaged in. This beetle occupies this special place with us. But in America, in France and in a number of other countries, they have tried to find ways of fighting it. But they have not found anything that is particularly effective. But the beetle itself has surrendered... after 50 years. More precisely, in this time period nature developed an antidote against it--the biopress [biopress]."

Naturally, a question arose in my mind: could it be that we have to wait out the time periods allotted by nature? But Nina Vladimirovna would not allow me to hold to this position.

"No, no. We cannot wait--the losses are too great: millions of tons of potatoes are destroyed. Moreover, we are already on the right road..."

In Transcarpatia, where this harmful beetle has feasted with might and main, biologists selected strains of fungi that are morbific for it and created under laboratory conditions a disease and after this started to conduct field experiments. It turned out that the fungus of the white muscardine, penetrating the organism of the grub, kills it in five-ten days and the beetle itself--in ten-fourteen days. It is true that not all the pests are destroyed during such an artificial epidemic: the most mature and strong survive, but their appetite is greatly moderated. The transmitted disease fails not to leave its trace--resistance is reduced in regard to unfavorable factors, and fertility is lowered. And the enemy no longer makes reeling blows, but only slight punches.

The searches helped find not only specifically acting morbific microorganisms, but also universal ones, capable of producing the disease immediately among several varieties of insects.

The biological preparations created on their basis have provided scientists with the joy of discoverers who have found an unknown patch of land. But the joy came and went, for when it came to introducing it, it turned out that this preparation was too expensive for mass production. What do you do? Retreat when you have found such remarkable remedies that are harmless to man, birds, fish and plants and which present no danger to useful insects? Especially if you take into account that the "predators" unseen to the eye could be preserved for ten years in nature and still constantly serve as a source of infection for pests--the only answer was that the preparations were worth fighting for.

Again, years of search. This time the biologists made a start, if it can be so called, from man. Everybody knews that the organism when weakened by hunger, cold or other unfavorable circumstances is more susceptible to illnesses. The same is true of insects. Strong heat, and, if you look, their number per unit of territory is sharply reduced. Or... massive poisoning. Yes, yes--weaken a harmful insect with a poison chemical and then infect it with some disease.

The opponents then say--again a return to dangerous poisons? Again. But this time in a more intelligent form. Consider: in order to destroy that same beetle, it would be necessary to expand per hectare of potato field more than a kilogram of poison--about 200 liters of the solution. If you consider that potatoes take up in the USSR about eight million hectares--the amounts of chemical agents used would even appear to the layman to be colossal. Now imagine that the chemical method of dealing with insects has been replaced by the biological. Here the pest dies if there are dispersed over a hectare of territory about twenty kilograms of the preparation made on the basis of disease-producing microorganisms--boverine.

But when the Kiev scientists corbined them together, an entirely different picture appeared. The mixture "bio + poison" reduced to zero the defects of each one of them and strengthened their merits. In point of fact, the mixtures turned out to be new preparations with a complex of properties attributable only to them. But the main thing is that less than one-twentieth of the microbic agent was needed, while the expenditure of harmful toxic substances was reduced by a factor of 16!

And now--long awaited recognition. The work of the Ukrainian microbiologists has crossed the borders of the Soviet Union--it is becoming known abroad. Strains isolated at the Ukrainian Scientific-Research Institute of Plant Protection have become standards for world collection--is this not a

tribute to scientific foresight and purposeful search? Yes, the discovery did take place, and it was namely it that determined the possibility of the present scientific-technical collaboration of U. S. scientists in the USSR on the utilization of microorganic synthesis.

All this, of course, does not mean that a taboo will be placed on chemical preparations, especially since chemists are also most fruitfully working on improving their properties. All in all, agriculture now has broad possibilities of preserving crops.
[423-7697]

7697
CSO: 1840

WORK OF UZBEK BIOMETHODS RESEARCH LABORATORIES DESCRIBED

Tashkent SOVET OZBEKISTANI in Uzbek 1 Aug 80 p 2

[Article by Ts. Bronshtein, chair head of the Samarkand State University in the name of A. Navaiy, and head of the Biological Control Research Problems' Laboratory: "Beneficial Insects Found"]

[Text] Work has been, and is being carried out in our nation to achieve the basic goals of the present stage of the agricultural policy of the CPSU. As research establishments, workers of higher educational institutions, experimentation stations, and workers and specialists of other institutions devoted to agriculture carry out the great program for developing agricultural production upon the basis of specialization, and concentration, they are also devoting special attention to the protection of plants. This involves, first of all, development of new, effective, and safe methods, methods of biological control in particular, to sharply reduce crop loss, and maintain crop quality while protecting the environment. Each year the number of research, regional, and production laboratories is growing, and their material and technical bases are being strengthened.

To accomplish this important task, our biologists, and workers and specialists in the agricultural sciences, are making an appropriate contribution. It is a source of pride that Samarkand scientists are in the first ranks nationally, and have developed biological control methods for agriculture against insects and weeds, have experimented with them on a broad basis, and have begun to put them into use. The Aqdarya inter-enterprise research production unit has been established for developing and applying biological control methods to protect agricultural crops against insects, disease and weeds, and has been operating successfully.

At the present time, biological control methods for protecting agricultural crops have acquired great importance in our republic. To be sure, the chemical methods for protecting crops against insects and disease, which have been used until very recently, have achieved one success after another. However, with the passage of time, insects and diseases have become adapted to chemical poisons, and the latter have become ineffective against them. If such poisons accumulate in the soil they can have undesirable ecological effects.

To protect the environment, and promote the health and well being of present and future generations, effort has been made to take appropriate measures, and find new, progressive methods of protecting agricultural crops. The most suitable of such new methods are those of biological control. The work is based upon the preeminent agrotechnical principles of agriculture, broad use of biological substances and insects, and the existing relationships of the plant and animal worlds. In essence, our scientists have created biological control methods that are adequately effective in protecting crops, but are safe for humans, and other living things, after carefully studying just these existing relationships.

That animals and plants are interconnected is no secret. Complicated, and varied relationships exist between them. This may be seen in the relationship between a small insect, and mites and spiders, which are its predators and parasites. The predators live by eating others, and parasites live from others. Scientists have been thinking that perhaps it would be possible to exploit this in protecting crops against insects. Thus, they studied the ability of this or that insect to eliminate a pest, the general benefits to be obtained from this, and, likewise, how this or that small creature was to be reproduced in the laboratory, and, later on, on an industrial basis. Samarkand scientists are now carrying out major research work. One example: it has been discovered that the ettikhalli bayqizi eats 620-750 aphids while a larva, and while developing, and, when mature, consumes 95-100 aphids a day.

It is interesting that the increase in numbers of plant pests is in response to this tiny predator. But as pest numbers increase, numbers of useful and beneficial insects also increase radically. When they have quickly eliminated the pests they move elsewhere.

Parasitic insects are also used in protecting crops. The trichogramma parasitoid wasp, which destroys the tangaqanatli pest, and the eggs of noctuidae, in particular, may be taken as an example. This useful insect is produced on an industrial basis in our country. Automatized bio-factories have been organized for this purpose. It is possible with the help of the gabrabrakan to eliminate cotton and winter wheat noctuidae. In addition, it is certain that there are predatory, and parasitical insects capable of eliminating pests while they are still in the pupa stage. These, and many other useful insects are considered important resources in biological struggle against crop pests. In addition, it is also possible to employ viruses and bacteria in biological control.

Conservation of natural stocks of predatory and parasitical insects that eliminate pests, that is, of entomophages, and of acariphages, which eliminate mites, and of herbiphages, which destroy weeds, and ensuring that their numbers are sufficient for use, will make it possible, in the end, to facilitate the protection of crops, and consequently reduce outlays for producing agricultural products, and reduce their costs, and ensure the health of our very basic environment.

Entomologists of the Chair of Invertebrate Zoology at our university have been studying useful and harmful insects of the region for more than 40 years. As a result we have gathered together a rich collection of useful entomophages and herbiphages. Biological control methods to combat different insects of the various river valley soil and climatic zones have been developed.

Many years of research successes have had a positive impact upon production. We may take the struggle against the shumghiya as an example. This group of plants reduces crops year after year in the Urgut rayon tobacco zone, and in the Samarkand, Kattaqorghan, and other rays of our oblast, and likewise in Tashkent, Qasqadarya, Bukhara and other oblasts. The struggle against the shumghiya has been carried out, in cooperation with the Botany Chair workers, with biological control methods. And these methods have begun to be applied on a broad basis. As a result, this parasitical grass has been eliminated from the farms in a short period of time. Biological control methods created in our university were applied, in 1978 alone, to 140,000 hectares in five union republics, in particular, in the Leninabad Oblast of Tajikistan. The methods have also been applied successfully in Yugoslavia, Bulgaria, Hungary and other countries.

At present, biological control methods are also being employed in grain cultivation, melon growing, horticulture, maize cultivation and alfalfa growing. Experiments have shown that good results are yielded in agriculture, and in cotton growing, in particular, by these agrotechnical methods in proper connection with external economic measures. Aqdarya rayon is a good example. The well-thought-of Aqdarya Inter-Enterprise Research and Production Union is playing a major role in the conservation of useful microorganisms, and in preserving the environment from pesticide polution, and, likewise, in improving biological control methodology. This new form of protecting crops has made it possible to apply biological control methods, and continue with fundamental research at the same time.

Experiments being carried out in Aqdarya rayon have begun to achieve rather fine successes. In particular, biological control methods are being employed with the goal of protecting alfalfa crops continually, over a period of several years, in the "Partiya XXII S'yezdi" kholkhoz. As a result, pest infestation of alfalfa has radically diminished, and the metamorphosis of ghumbak into butterflies has been reduced to 10-12 percent. This, in turn, has made possible an increase of fertility.

We have already mentioned the superiority of biological control methods against cotton plant noctuidae. It has been shown that a substantial number of enterprises have increased fertility due to the use of trichogramma parasitoid wasp and the dendrabatsil. In 1978 alone, biological control methods were used for 94 percent of the total crops of the rayon, and, as a result of the struggle against agricultural pests in this year, 300,000 roubles have been saved.

There is no doubt that inter-enterprise research and production unions based on biological control methods to protect crops will be organized in other places, for biological control methods against crop pests, disease and weeds have become a good aid for the agriculture of our republic. The USSR law "Concerning Prevention of Atmospheric Polution," recently sanctioned by the USSR Supreme Soviet, provides strict guidelines on the use of pesticides by enterprises. Just at the present time, convenient, and useful biological control methods are becoming more widespread in production everywhere. Biological laboratories, and even biofactories, have been brought into being in kholkhoz and sovkhoz. Experience shows that increase of agricultural production, and the raising of the fertility and quality of agricultural products, is connected with a very intelligent method, biological control, for protecting crops.
[706-11,433]

11,433
CSO: 1810

MICROBIAL METALLURGY

Moscow PRAVDA in Russian 18 Jul 80 p 3

[Article by Professor S. Pol'kin, honored scientist and technician of the RSFSR, Moscow]

[Text] A selection of materials published in "Pravda" 2 June described some of the broad prospects in industrial microbiology and the many-sided "capacities" of microorganisms. In this connection, I want to touch upon another problem of importance to the national economy.

Production and consumption of non-ferrous, rare, noble and other metals increase each year and their ore content is decreasing continuously. Now we often find only as much metal in these ores as was found previously in the dumpings. Therefore, one of the most important problems of miners and metallurgists is the complex utilization of mineral resources and more complete recovery of valuable components from the raw material mined.

This problem can be solved most effectively with the use of combined methods, including hydrometallurgical enrichment methods, supplemented by the use of microorganisms. Domestic and foreign scientists have shown, in particular, that, for many low-grade dumpings and scarcely-processible "stubborn" ores, the best approach is the technique of bacterial chemical leaching. This method involves cultivation in a liquid of a special variety of bacteria which utilizes substances of the liquid in their vital activity and the application of the liquid to the ore. The bacteria break down the minerals and change the metal into soluble form, so that it only remains to extract it from the liquid.

Research has shown that, using thiogenic bacteria which abound in nature, it is possible to obtain copper, zinc, uranium, nickel, molybdenum, cobalt, manganese and bismuth. Other varieties of bacteria help to obtain aluminum and even gold. The cost of metals extracted by such a method is much lower (for example, 3-5 times lower for copper) than the cost of methods usually used.

In addition to this, "microbial" metallurgy permits extraction of metal from the lean raw material itself and the separation of it from complex concentrates, which contain simultaneously copper, zinc, lead and other components, and the removal of harmful admixtures.

However, in spite of the amount of savings involved and the national economic and ecological significance of the methods of bacterial-chemical leaching, most research in this area is at the stage of laboratory development.

One of the causes of the slow advance of the introduction into actual use is the lack of unification of the efforts of scientists and practical workers. Development of the scientific principles and technological schemes of bacterialleaching is being undertaken by many small groups in research organizations of the AS USSR and in some ministries but not one of them is at a point at which they have the capability for the comprehensive solution of this complex problem--this requires the participation of specialists of different disciplines: microbiologists, technologists for enrichment of minerals and hydrometallurgists, geologists, chemists and designers.

Only an authoritative, interdepartmental organization has the capacity to coordinate all of these operations. Such a regulatory center can be created under the aegis of the Main Administration of the Microbiology Industry in affiliation with the USSR Council of Ministers. The increase of the complexity of use of mineral raw material and the increment of production of valuable metals depend greatly on the solution of this organizational problem.
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